



Electro-Textiles

Integration of Computers and Electronics with Textiles for Future Warrior Systems

Overview:

Natick Soldier Center has a high interest in integrating electronic capabilities and optical components with textile materials and soldier equipment. Future Warrior Systems already being planned have heads up displays, wireless weapons, global positioning, chemical detectors, battery power, physiological status sensors, and combat ID, all linked to the Warrior's personnel computer to assist in situational awareness and understanding. Electronic devices are being miniaturized for personal use; however, limited technologies exist to integrate electronics into clothing. Combat clothing materials are currently passive. Consequently, the integration of electronics into the Soldier System will provide enhanced capabilities by providing real-time information to the soldier on the battlefield. Active intelligent textile systems have the capacity of improving the Warrior's performance by sensing and responding to a situational combat need allowing the Warrior to continue his mission without distraction. The overall solution is to convert passive combat clothing into active materials that provide electronic/optical power and data transmission to the on-body computer, batteries, displays, and sensors, and several integrated antennas for near and remote communications.

Description:

Personal area network cables and connectors for attaching sensors and computer peripheral devices, as well as a variety of visually concealed antennas for near and remote communications need to be integrated into the Warrior's clothing and equipment to reduce weight and bulk of the current electronic system being hung on the Warrior. Other areas of interest include the integration of solar and other power generating components and conductive plastic batteries into textiles. Customers include PM-Soldier, SOCOM, and Objective Force Warrior.

Status:

Funding for this effort has come from a variety of sources, including Army S&T, SBIR, and Manufacturing Technology programs depending on the maturity of the individual technology.

A future soldier system electronic network has been mapped that will serve as the soldier's electronic backbone. A prototype flat USB bus and connectors integrated into narrow fabrics have been successfully developed, as well as an integrated wearable combined Soldier/GPS antenna. Current efforts also include a suite of wearable antennas, textile embedded electrical/optical zipper and rotational snap connectors, other flat textile based networks and ergonomic connectors, textile-based antenna radiators for long-distance and multi-frequency antennas, manufacturing techniques to integrate electrical/optical conductors into various textile constructions and stitchless seams, pin-less flat connectors, and a pressure sensitive textile-based computer input device.



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